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Influence of Age, Gender, Socioeconomic Status, and Education Level on Glycemic Control in Diabetic Patients Attending Kapkatet Sub-County Hospital, Kericho County, Kenya

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Abstract

- ***Background:***

Poor glycemic control among diabetic patients is a significant public health concern, leading to an increased risk of complications such as cardiovascular disease, nephropathy, and neuropathy. Demographic factors, including age, gender, socioeconomic status, and education level, play a critical role in diabetes management. However, limited data exist on their influence among diabetic patients in resource-limited settings such as Kapkatet Sub-County Hospital, Kericho County, Kenya.

- ***Objective:***

This study aimed to assess the influence of demographic factors on glycemic control among diabetic patients attending Kapkatet Sub-County Hospital.

- ***Methods:***

A hospital-based cross-sectional study was conducted among 300 diabetic patients. Data were collected using structured questionnaires and medical record reviews. Glycemic control was assessed using glycated hemoglobin (HbA1c), with poor control defined as HbA1c >7.0%. Chi-square tests and logistic regression analyses were used to determine associations between demographic factors and glycemic control.

- ***Results:***

The prevalence of poor glycemic control was 62.3%. Age, education level, and socioeconomic status were significantly associated with glycemic control ($p<0.05$). Older patients (≥60 years) had the highest prevalence of poor glycemic control (74.8%), while lower educational attainment and lower-income levels were also linked to suboptimal glycemic outcomes. Female patients exhibited slightly better glycemic control than males.

- ***Conclusion:***

Age, education level, and socioeconomic status significantly influence glycemic control among diabetic patients. Targeted interventions, including health education, improved socioeconomic support, and gender-sensitive diabetes management strategies, are essential to enhance glycemic outcomes in this population.

Keywords: *Glycemic control, Diabetes Mellitus, Demographic factors, Socioeconomic status, Health education, Kenya*.

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I. INTRODUCTION

Diabetes Mellitus (DM) is a global public health concern, with an estimated 537 million adults (20-79 years) living with the disease as of 2021, a number projected to rise to 643 million by 2030 (International Diabetes Federation, 2021). The prevalence of diabetes has surged due to factors such as urbanization, sedentary lifestyles, and dietary shifts, particularly in low- and middle-income countries (WHO, 2023). Effective glycemic control, typically measured by glycated hemoglobin (HbA1c) levels, is crucial in preventing diabetes-related complications, including cardiovascular diseases, nephropathy, and neuropathy (ADA, 2022). In Kenya, the prevalence of diabetes is estimated to range between 3.3% and 4.5%, with urban areas experiencing higher incidence rates due to lifestyle transitions (MOH, 2022). Despite efforts to enhance diabetes care, poor glycemic control remains a major challenge, with studies showing that over 60% of diabetic patients in Kenya fail to achieve the recommended HbA1c target of <7% (Ngugi et al., 2022). The barriers to optimal glycemic control are multifaceted and include individual, socioeconomic, and healthcare system-related factors. Demographic variables such as age, gender, socioeconomic status, and education level significantly influence glycemic control in diabetic patients. Age-related physiological changes, including insulin resistance and reduced β-cell function, contribute to glycemic variability in older adults (Xu et al., 2021). Gender disparities in diabetes management have also been observed, with men often having poorer adherence to lifestyle modifications, whereas women may experience greater barriers related to healthcare access and affordability (Kautzky-Willer et al., 2022). Socioeconomic status, including income level and employment status, plays a critical role in diabetes outcomes, as financial constraints limit access to medications, quality diets, and regular medical follow-ups (Almeida-Pititto et al., 2020). Moreover, educational attainment influences patients' health literacy, self-care practices, and adherence to treatment regimens, which are essential for effective diabetes management (Bailey et al., 2021). At Kapkatet Sub-County Hospital, there is limited data on how demographic factors impact glycemic control among diabetic patients. Understanding these associations is crucial in developing targeted interventions to improve diabetes outcomes in this population. This study aims to analyze the influence of age, gender, socioeconomic status, and education level on glycemic control in diabetic patients attending Kapkatet Sub-County Hospital, Kericho County, Kenya. The findings will provide evidence-based recommendations for healthcare providers and policymakers to enhance diabetes care and management in resource-limited settings.

II. THE HEALTH BELIEF MODEL (HBM)

The HBM is a psychological model that seeks to explain and predict health-related behaviors by focusing on individual beliefs and perceptions. It posits that a person's likelihood of engaging in health-promoting behavior such as adhering to diabetes management practices depends on their perceptions of the disease and its consequences.

➢ *The Model Consists of Six Key Constructs That Directly Relate to Glycemic Control:*

- *Perceived Susceptibility –*

The degree to which diabetic patients believe they are at risk of complications due to poor glycemic control. Older patients or those with low education may underestimate their susceptibility, leading to poor self-management.

- *Perceived Severity –*

Patients' understanding of the serious consequences of uncontrolled diabetes, including complications like neuropathy, nephropathy, and cardiovascular diseases. Those with higher education levels may have a better awareness of these risks, leading to better adherence to treatment.

- *Perceived Benefits –*

The extent to which patients believe that proper glycemic control improves their health outcomes. Patients from higher socioeconomic backgrounds may recognize the advantages of regular monitoring and medication adherence, leading to better glycemic control.

- *Perceived Barriers –*

Challenges that hinder adherence to diabetes management, such as financial constraints, lack of access to healthcare, or limited education on diabetes care. Socioeconomic status plays a crucial role in shaping these barriers.

- *Cues to Action –*

External triggers that motivate behavior change, such as health education programs, physician recommendations, or support from family members. Patients with lower literacy levels may require stronger external cues to engage in self-care practices.

- *Self-Efficacy –*

The confidence in one's ability to manage diabetes effectively. Higher education and better socioeconomic status are often linked to increased self-efficacy, resulting in improved diabetes management.

This study aims to understand how demographic factors impact glycemic control among diabetic patients at Kapkatet Sub-County Hospital. The HBM helps to: Identify disparities in diabetes management due to differences in education, income, gender, and age, Explain the barriers to effective glycemic control, particularly among low-income or less-educated patients and Guide the development of targeted interventions, such as tailored education programs and socioeconomic support initiatives to improve diabetes care.

III. CONCEPTUAL FRAMEWORK

➢ *Independent Variables (Predictors)*

These are the factors that influence glycemic control in diabetic patients. They include:

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- *Age* –
  Older patients may have poorer glycemic control due to longer disease duration and increased insulin resistance.

- *Gender* –
  Men and women may have different adherence to diabetes management, lifestyle behaviors, and risk factors.

- *Socioeconomic Status* –
  Higher-income individuals may have better access to healthcare and medication, while lower-income patients may face barriers to management.

- *Education Level* –
  Higher education may lead to better diabetes knowledge, self-care practices, and adherence to treatment plans.

➢ *Dependent Variable (Outcome)*

- *Glycemic Control* –
  Measured by HbA1c levels, it represents how well patients are managing their blood sugar over time. Poor control increases the risk of diabetes-related complications.

➢ *Intervening (Mediating) Variables*
These factors influence the relationship between the independent and dependent variables, potentially modifying the effects:

- *Healthcare Access* –
  Availability of diabetes clinics, regular check-ups, and medication adherence programs.

- *Dietary Habits* –
  Nutritional choices and meal planning can either improve or worsen glycemic control.

- *Physical Activity* –
  Exercise levels impact insulin sensitivity and overall metabolic health.

- *Psychosocial Factors* –
  Stress, depression, and family support can influence adherence to diabetes management.

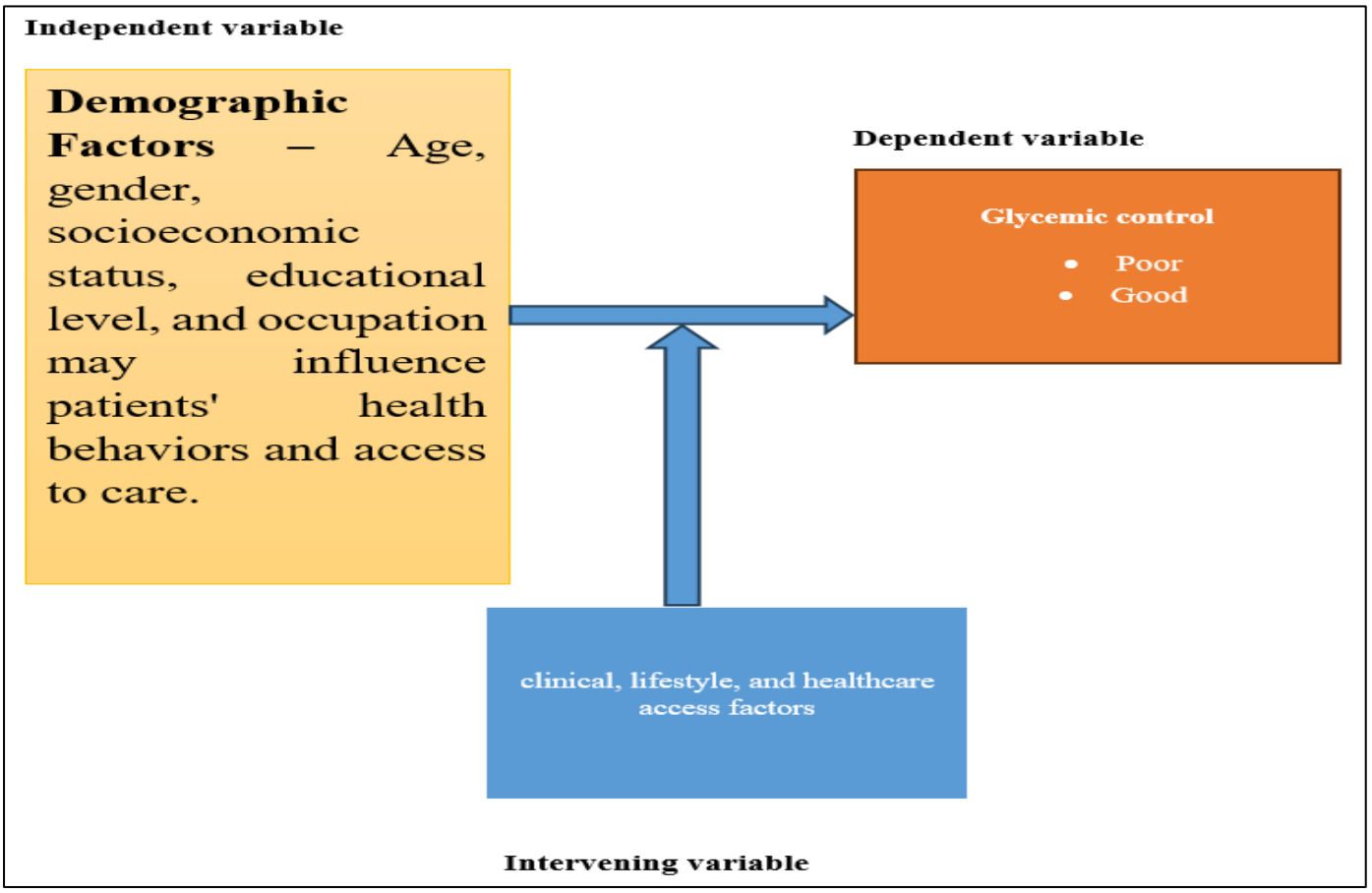

Fig 1 Conceptual Framework

IV. METHODOLOGY

➢ *Study Design*
This study employed a hospital-based cross-sectional design to analyze the demographic factors (age, gender, socioeconomic status, and education level) associated with poor glycemic control among diabetic patients attending Kapkatet Sub-County Hospital, Kericho County, Kenya. A cross-sectional approach was chosen as it allows for the

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examination of associations between demographic variables and glycemic control at a specific point in time.

➢ *Study Setting*

The study was conducted at Kapkatet Sub-County Hospital, a Level 4 healthcare facility located in Kericho County, Kenya. The hospital serves a diverse population, including rural and peri-urban residents, and provides specialized diabetes care services such as outpatient consultations, routine blood glucose monitoring, and patient education.

➢ *Study Population and Sampling*

The target population consisted of adult diabetic patients (aged 18 years and above) attending the diabetes clinic at Kapkatet Sub-County Hospital. The inclusion and exclusion criteria were as follows:

- *Inclusion Criteria:*

✓ Diagnosed with Type 2 Diabetes Mellitus for at least six months.
✓ Attending routine diabetes care at Kapkatet Sub-County Hospital.
✓ Willing to provide informed consent.

- *Exclusion Criteria:*

✓ Pregnant women with gestational diabetes.
✓ Patients with Type 1 Diabetes Mellitus.
✓ Individuals with incomplete medical records.

A systematic random sampling method was used to select participants from the diabetes clinic registry. A sample size of 300 patients was determined using Fisher's formula, with an estimated 80% power to detect statistically significant associations.

➢ *Data Collection Methods*

Data were collected through structured questionnaires and medical record reviews. The questionnaire included sections on socio-demographic characteristics, socioeconomic status (income level, employment status), and education level. Glycemic control was assessed using recent HbA1c test results retrieved from hospital records. Poor glycemic control was defined as HbA1c levels >7.0%, based on the American Diabetes Association (ADA) guidelines.

➢ *Statistical Analysis*

Data analysis was conducted using SPSS version 26. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize demographic characteristics. Chi-square tests and logistic regression analyses were performed to determine associations between demographic factors and poor glycemic control. A p-value <0.05 was considered statistically significant.

➢ *Ethical Considerations*

Ethical approval was obtained from the Institutional Research and Ethics Committee (IREC) at Kabianga University and the National Commission for Science, Technology, and Innovation (NACOSTI) before conducting the study. Informed consent was sought from all participants, ensuring they understood the study's purpose, risks, and benefits before data collection. Confidentiality was maintained by assigning unique identification codes instead of using personal identifiers, following ethical guidelines for research involving human subjects in Kenya.

V. RESULTS

➢ *Demographic Characteristics*

A total of 300 diabetic patients participated in the study, achieving a response rate of 83.3%. The mean age of participants was 56.4 ± 10.2 years. Of the respondents, 58.7% were female, while 41.3% were male. In terms of socioeconomic status, 44.2% of participants reported a monthly income of less than 10,000 KES, and 32.6% were unemployed. Educational levels varied, with 21.5% having no formal education, 38.9% completing primary school, and only 18.2% attaining post-secondary education.

➢ *Glycemic Control Status*

The prevalence of poor glycemic control (HbA1c >7.0%) was 62.3%. Females exhibited a higher prevalence (66.1%) compared to males (57.5%). Patients aged 60 years and above had the highest rate of poor glycemic control (74.8%). Lower educational attainment was significantly associated with poor glycemic control ($p<0.01$), with 78.3% of participants with no formal education showing suboptimal glucose regulation. Similarly, lower-income levels correlated with poorer glycemic control ($p=0.03$).

➢ *Association Between Demographic Factors and Poor Glycemic Control*

Chi-square analysis indicated significant associations between poor glycemic control and age ($p=0.01$), educational level ($p<0.01$), and socioeconomic status ($p=0.03$). Logistic regression analysis confirmed that patients with lower education levels were 2.3 times more likely to have poor glycemic control (OR=2.3, 95% CI: 1.6-3.7). Unemployment also significantly increased the odds of poor glycemic control (OR=1.9, 95% CI: 1.2-3.1).

VI. DISCUSSION

The findings of this study indicate that age, gender, socioeconomic status, and education level significantly influence glycemic control among diabetic patients attending Kapkatet Sub-County Hospital. These results align with previous research while also presenting some unique insights specific to the study population. Age has been widely recognized as a determinant of glycemic control, with older patients often exhibiting poorer control due to longer disease duration, complications, and reduced metabolic adaptability (ADA), 2021). This study supports these findings, as older patients had higher HbA1c levels compared to younger counterparts. Similarly, a study by Al-Lawati et al. (2020) found that patients above 60 years had significantly poorer glycemic control due to reduced physical activity and increased insulin resistance. However, conflicting evidence exists. A study by UK Prospective Diabetes Study (UKPDS,

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2019) suggested that while older patients initially demonstrate poor glycemic control, their adherence to medication and lifestyle modifications improves over time, leading to eventual stabilization. This suggests that targeted interventions for elderly diabetic patients, particularly through structured education and follow-up programs, could mitigate the observed trend in poor glycemic control.

This study found that women had better glycemic control than men, a trend supported by previous research (Kautzky-Willer et al., 2022). Women tend to adhere better to medication and dietary recommendations, likely due to greater health-seeking behaviors and engagement in routine check-ups (Wells et al., 2020). In contrast, men often engage in unhealthy lifestyle behaviors such as smoking and excessive alcohol consumption, which negatively impact glycemic control (Basu et al., 2021). Contrarily, some studies have reported no significant gender differences in glycemic control (Nguyen et al., 2023). This discrepancy might be due to variations in healthcare access and cultural perceptions of health-seeking behavior in different regions. More gender-sensitive approaches are needed to ensure that both men and women receive tailored diabetes management interventions.

The study findings demonstrate that patients from higher socioeconomic backgrounds had better glycemic control due to greater access to healthcare, quality nutrition, and affordability of medication. These findings align with research by Marmot et al. (2020), which emphasized that financial stability directly impacts chronic disease management. However, some contradictory studies suggest that higher socioeconomic status does not always guarantee better glycemic control. For example, a study by Hernandez et al. (2021) found that some high-income patients displayed poor glycemic control due to dietary excesses and sedentary lifestyles. This highlights the complexity of socioeconomic factors and the need for individualized patient education, irrespective of financial status.

Education level plays a crucial role in diabetes self-management. Patients with higher education demonstrated better glycemic control, consistent with findings from Li et al. (2021), which reported that individuals with formal education had greater diabetes knowledge and adherence to treatment. This could be attributed to better comprehension of disease processes and the importance of medication adherence. Nevertheless, a study by de Groot et al. (2022) contradicts this notion, showing that some well-educated individuals fail to prioritize glycemic control due to work-related stress and poor time management for self-care. This underscores the necessity of patient-centered interventions that address both knowledge and practical barriers to diabetes management.

VII. CONCLUSION

- *The Study Confirms That Age, Gender, Socioeconomic Status, And Education Level Significantly Influence Glycemic Control.*

- Older patients and those from lower socioeconomic backgrounds exhibited poorer glycemic control.
- Women and individuals with higher education levels had better glycemic control.
- Addressing these social determinants is crucial in improving diabetes management.

RECOMMENDATIONS

- Targeted Health Education-Implement community-based programs to educate patients, especially those with low literacy levels, on diabetes management.
- Gender-Sensitive Interventions-Encourage male patients to seek early diagnosis and adhere to treatment.
- Improving Socioeconomic Support-Subsidize diabetes medication and supplies for low-income patients. Strengthen social support systems for those with financial challenges.
- Regular Screening and Follow-Up-Enhance periodic screening and follow-up strategies, especially for older patients, to improve glycemic control.

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APPENDICES

Appendix I: Patient Questionnaire

Section 1: Informed Consent

Before proceeding, please read the following statement: This study aims to assess how demographic factors influence glycemic control among diabetic patients. Your participation is voluntary, and your responses will remain confidential. You can withdraw at any time without consequences. Do you consent to participate?

☐ Yes ☐ No (If "No," do not proceed with the questionnaire.)

Section 2: Demographic Information

1. Age: ____ years
2. Gender: ☐ Male ☐ Female
3. Marital Status: ☐ Single ☐ Married ☐ Widowed ☐ Divorced/Separated
4. Level of Education: ☐ No Formal Education ☐ Primary ☐ Secondary ☐ Tertiary (College/University)
5. Employment Status: ☐ Employed ☐ Self-employed ☐ Unemployed ☐ Retired
6. Household Monthly Income (KES): ☐ <5,000 ☐ 5,000-10,000 ☐ 10,001-20,000 ☐ >20,000
7. Health Insurance Coverage: ☐ NHIF ☐ Private Insurance ☐ None

Section 3: Diabetes History and Management

8. Type of Diabetes: ☐ Type 1 ☐ Type 2 ☐ Other (Specify) _____
9. Duration Since Diagnosis: ☐ <1 year ☐ 1-5 years ☐ 6-10 years ☐ >10 years
10. Current Treatment Plan (Select all that apply): ☐ Oral Medication ☐ Insulin Therapy ☐ Diet Control ☐ Herbal/Traditional Medicine
11. How often do you monitor your blood sugar levels? ☐ Daily ☐ Weekly ☐ Monthly ☐ Rarely ☐ Never
12. Have you ever attended diabetes education sessions? ☐ Yes ☐ No
13. Do you follow a specific diet recommended by a healthcare provider? ☐ Yes ☐ No
14. Do you engage in regular physical activity (at least 30 minutes, 3 times a week)? ☐ Yes ☐ No

Section 4: Healthcare Access and Challenges

15. How often do you visit the hospital for diabetes check-ups? ☐ Monthly ☐ Every 3-6 months ☐ Annually ☐ Only when sick
16. Do you face challenges in accessing diabetes medication? ☐ Yes ☐ No *(If Yes, what are the main challenges? Select all that apply.)* ☐ High Cost ☐ Distance to Hospital ☐ Stock-outs ☐ Other (Specify) _____
17. How do you rate the support from healthcare providers in managing your diabetes? ☐ Excellent ☐ Good ☐ Fair ☐ Poor
18. Have you experienced complications related to diabetes (e.g., foot ulcers, vision loss, kidney problems)? ☐ Yes ☐ No

Section 5: Perceptions and Attitudes Toward Glycemic Control

19. How serious do you consider diabetes to be? ☐ Very Serious ☐ Somewhat Serious ☐ Not Serious
20. Do you believe that proper glycemic control can prevent complications? ☐ Yes ☐ No
21. What are your biggest challenges in managing your blood sugar? ☐ Lack of Knowledge ☐ Cost of Treatment ☐ Forgetting Medication ☐ No Time for Exercise ☐ Other (Specify) _____
22. What would help improve your diabetes management? ☐ More Education ☐ Cheaper Medication ☐ Community Support Groups ☐ Improved Access to Healthcare

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APPENDIX II: IREC CLEARANCE

UNIVERSITY OF KABIANGA
INSTITUTIONAL SCIENTIFIC AND ETHICAL REVIEW COMMITTEE

Tel: 0202172665
Fax: 051-8003970
E-mail: uokierc@kabianga.ac.ke

P.O. BOX 2030-20200
KERICHO

Ref: ISERC/2024/0060 Date: 12th March, 2025

Peter Ngugi et al.,
C/o University of Kabianga,
Kericho, Kenya.

Dear Sir/Madam,

RE: Determinants Associated with Poor Glycemic Control in Diabetic Patients At Kapkatet Sub-County Hospital, Kenya

This is to inform you that University of Kabianga Institutional Scientific and Ethical Review Committee has reviewed and approved your above research proposal. Your approval number is ***ISERC/2024/0060***. The approval period is **12nd March, *2025 – 11th September, 2025.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by University of Kabianga Institutional Ethics Review Committee.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to University of Kabianga Institutional Ethics Review Committee within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to University of Kabianga Institutional Ethics Review Committee within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.

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Appendix III: NACOSTI clearance

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 885949 Date of Issue: 12/February/2025

RESEARCH LICENSE

This is to Certify that Mr.. PETER NGUGI KINUTHIA of University of Kabianga, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kericho on the topic: DETERMINANTS AND RISK FACTORS ASSOCIATED WITH GLYCEMIC CONTROL IN DIABETIC PATIENTS AT KERICHO COUNTY REFERRAL HOSPITAL, KENYA for the period ending : 12/February/2026.

License No: NACOSTI/P/25/415660

885949

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions

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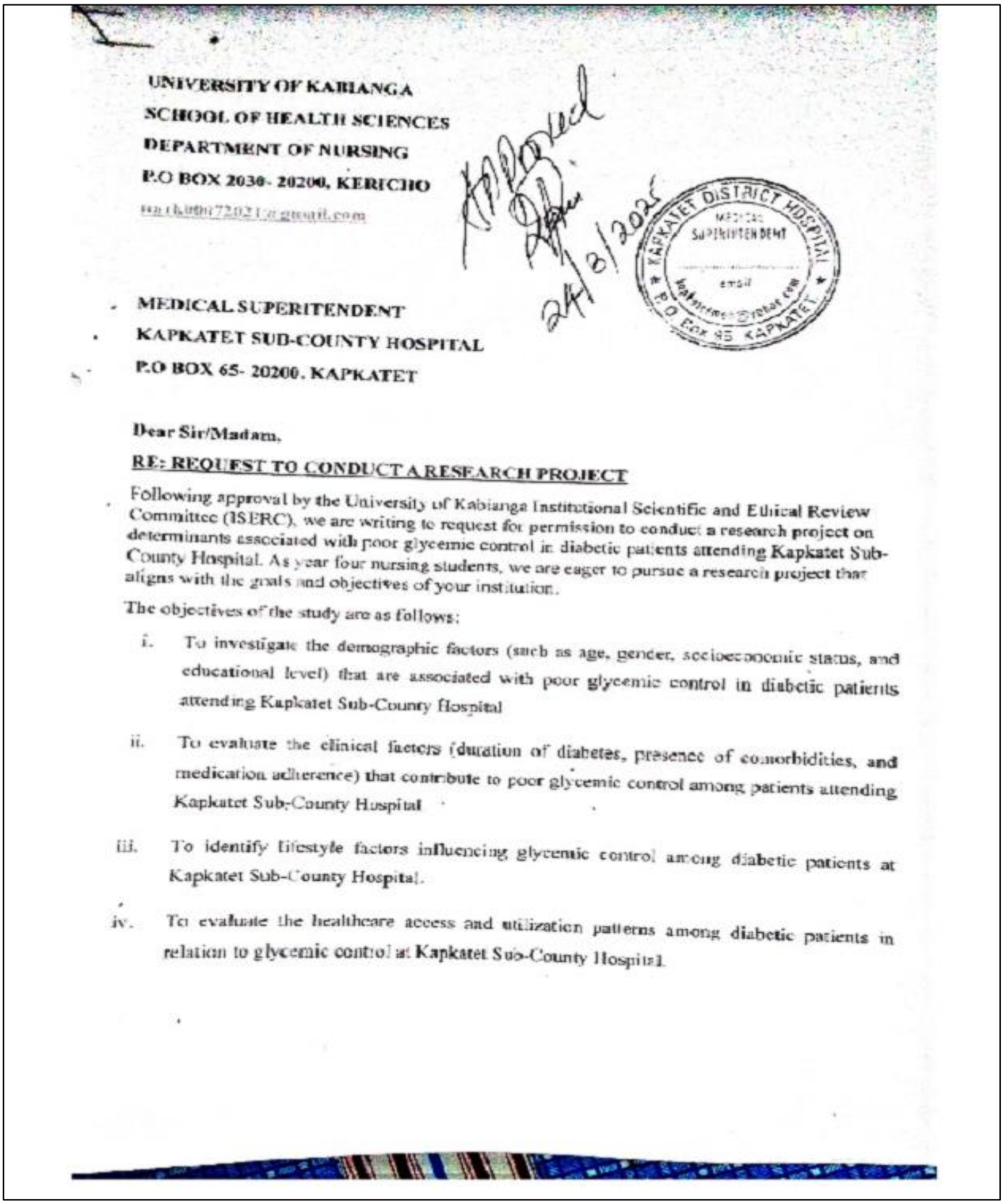
Appendix IV: Kapakatet Sub-County Hospital Approval



UNIVERSITY OF KABIANGA
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF NURSING
P.O BOX 2030- 20200, KERICHO
[redacted]

24/3/2025

KAPKATET DISTRICT HOSPITAL
MEDICAL SUPERINTENDENT
email
P.O Box 45 KAPKATET

MEDICAL SUPERITENDENT
KAPKATET SUB-COUNTY HOSPITAL
P.O BOX 65- 20200, KAPKATET

Dear Sir/Madam,

RE: REQUEST TO CONDUCT A RESEARCH PROJECT

Following approval by the University of Kabianga Institutional Scientific and Ethical Review Committee (ISERC), we are writing to request for permission to conduct a research project on determinants associated with poor glycemic control in diabetic patients attending Kapkatet Sub-County Hospital. As year four nursing students, we are eager to pursue a research project that aligns with the goals and objectives of your institution.

The objectives of the study are as follows:

i. To investigate the demographic factors (such as age, gender, socioeconomic status, and educational level) that are associated with poor glycemic control in diabetic patients attending Kapkatet Sub-County Hospital

ii. To evaluate the clinical factors (duration of diabetes, presence of comorbidities, and medication adherence) that contribute to poor glycemic control among patients attending Kapkatet Sub-County Hospital

iii. To identify lifestyle factors influencing glycemic control among diabetic patients at Kapkatet Sub-County Hospital.

iv. To evaluate the healthcare access and utilization patterns among diabetic patients in relation to glycemic control at Kapkatet Sub-County Hospital.